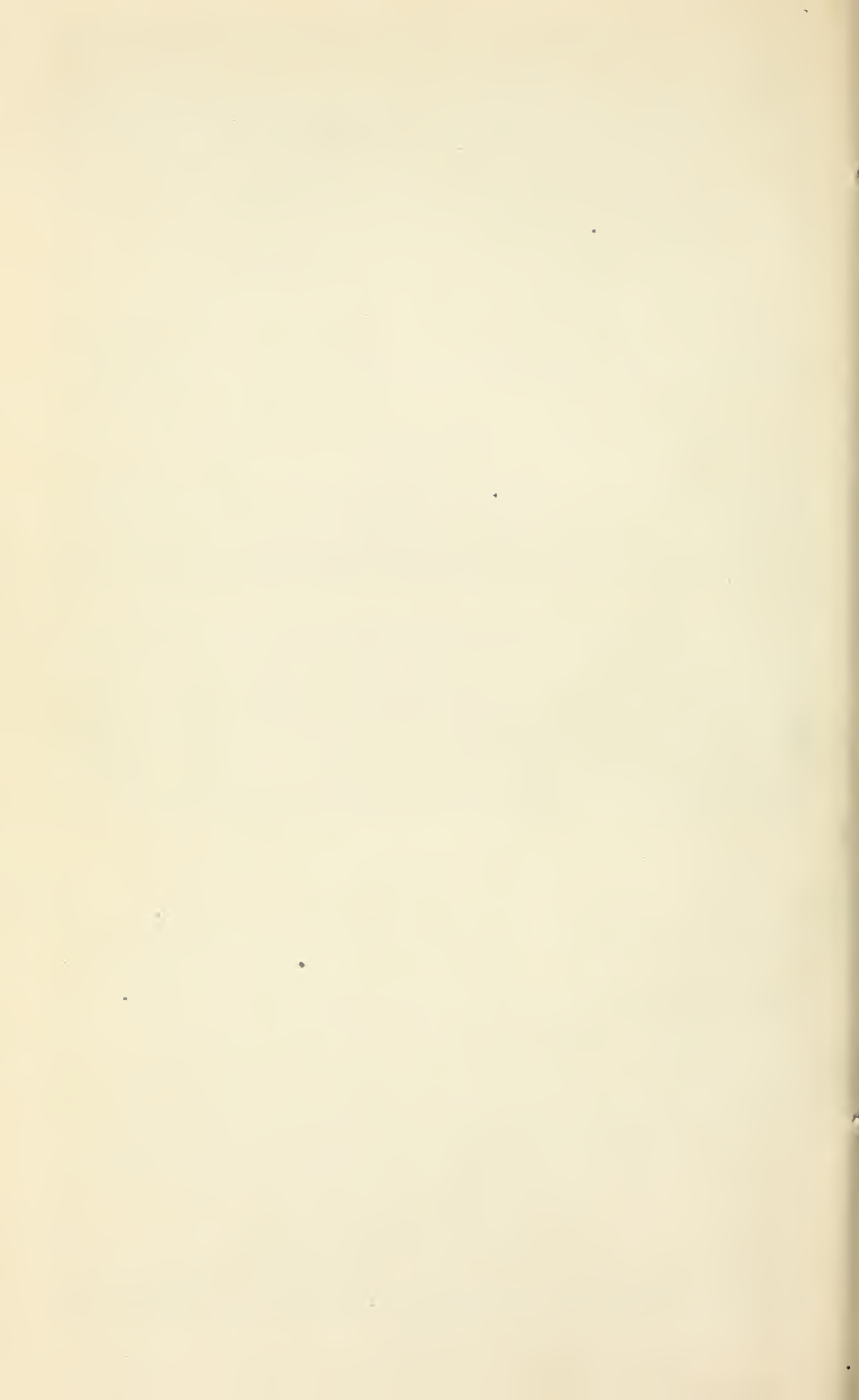


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DEPARTMENT OF AGRICULTURE  
OF ARTS AND SCIENCES

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Department of Justice

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\* \* \* to acquire and preserve in his Department all information concerning agriculture which he can obtain by means of books and correspondence and by practical and scientific experiments (accurate records of which experiments shall be kept in his office), by the collection of statistics, and by any other appropriate means within his power; to collect, as he may be able, new and valuable seeds and plants; to test by cultivation the value of such of them as may require such tests; to propagate such as may be worthy of propagation, and to distribute them among agriculturists. He shall annually make a general report in writing of his acts to the President and to Congress, in which he may recommend the publication of papers forming parts of or accompanying his report, which report shall also contain an account of all moneys received and expended by him. He shall also make special reports on particular subjects whenever required to do so by the President or either House of Congress, or when he shall think the subject in his charge requires it.

*Assistant Secretary of Agriculture,* —————

The Assistant Secretary of Agriculture performs such duties as may be required by law or prescribed by the Secretary. He also becomes the Acting Secretary of Agriculture in the absence of the Secretary.

*Chief Clerk, S. R. BURCH.*

The Chief Clerk has the general supervision of the clerks and employees; of the order of business, and of the records and correspondence of the Secretary's office; of all expenditures from appropriations for contingent expenses, stationery, etc.; is responsible for the enforcement of the general regulations of the Department; and is custodian of the buildings occupied by the Department of Agriculture.

*Appointment Clerk, JOSEPH B. BENNETT.*

The Appointment Clerk is charged by the Secretary with the decision of all questions affecting appointments, transfers, promotions, reductions, details, furloughs, and removals in their relation to the Civil Service regulations, and with the preparation of all papers necessitated thereby. He has charge of all correspondence of the Department with the United States Civil Service Commission, and of all certificates and communications issued by that Commission to the Department, and deals with all questions affecting positions in the classified service. He is the recorder and custodian of the oaths of office and personal reports of all persons appointed in the Department, and of all reports of the several Chiefs of Bureaus, Divisions, and Offices respecting the efficiency of the several clerks and employees under their respective supervision in the Department. He has the custody and use of the Department seal.

*Chief of Supply Division, CYRUS B. LOWER.*

The Supply Division has charge of purchases of supplies and materials paid for from the general funds of the Department.

*Museum Caretaker, NATHANIEL SHATSWELL.*

The Museum is the depository for objects of interest in agriculture in the possession of the Department. These are mostly educational.

## THE WEATHER BUREAU.

*Chief*, WILLIS L. MOORE; *Assistant Chief*, HENRY E. WILLIAMS; *Chief Clerk*, DANIEL J. CARROLL; *Private Secretary to Chief of Bureau*, EDGAR B. CALVERT.

It is the duty of the Weather Bureau to make accurate record day by day of the existing atmospheric conditions, and to formulate therefrom for distribution, in the interest and for the benefit of agriculture, commerce, and navigation, forecasts of the weather that will probably obtain during the succeeding forty-eight hours.

For the purpose of making its daily atmospheric survey the Weather Bureau maintains a Central Office in Washington and about 190 subordinate stations in various portions of the United States and throughout the West Indies. In addition to these it receives through the courtesy of the Governments concerned daily telegraphic reports of observations made in Canada on the north, Mexico on the south, and in the Azores and along the western coast of Europe to the eastward, thus covering within its field of observation practically the whole of the inhabited portions of the North American Continent.

### THE FORECAST DIVISION.

EDWARD B. GARRIOTT, *in Charge*.

This Division receives and charts twice daily telegraphic reports of the prevailing weather conditions throughout the field of observation. From the observations thus charted the forecast official issues a statement of impending weather changes in all parts of the country, including the Great Lakes, the sea coasts, and the North Atlantic steamer route as far eastward as the Grand Banks. In the case of severe disturbances warnings are sent, not only to the regular Weather Bureau stations along the Lakes and sea coast, but also to about 236 special storm-warning stations at the lesser ports and at exposed points visible from the fairway of vessels. The forecast official also issues warning of approaching cold waves and heavy snows in the winter season, of frost in the spring and fall months, special attention being given to the needs of truck farmers in the Gulf and South Atlantic States and the fruit growers of Florida and California. The River and Flood Service, a branch of this division, is, as its name implies, concerned with the rivers of the United States. In times of average or low-water stages its business is to facilitate commerce by giving information as to future stages of water along the navigable rivers; its chief function, however, is the issuance of flood warnings in time of threatened danger to life and property along the rivers, whether navigable or otherwise.

This service maintains 307 special river stations along the rivers of the country, in addition to 49 regular Weather Bureau stations where river observations are taken. There are also 88 special rainfall stations maintained in the various watersheds.

### THE CLIMATE AND CROP DIVISION.

JAMES BERRY, *Chief*.

The duties of this Division embrace the system by which records of daily observations of temperature, precipitation, and miscellaneous weather phenomena are collected and published in monthly reports of State and Territorial Sections of the Climate and Crop Service; the collection, from nearly 15,000 correspondents, during the season of planting, cultivating, and harvesting, of weekly data as to the current climatic conditions and their effects upon various crops and farming operations, which data are summarized and published in the National Weekly Crop Bulletin and in 43 Section Bulletins; the establishment and maintenance of voluntary meteorological stations, of which there are more than 3,300; the supervision of the special services, consisting of the telegraphic collection of daily temperature and rainfall reports and their publication in bulletin form at district centers, for the benefit of the corn, wheat, cotton, sugar, rice, and fruit interests; the collection and publication weekly during the winter months of data show-



ing the depths of snow on the ground and the thickness of ice in rivers and harbors; the establishment of stations for the display of weather flags and the general distribution of forecasts and special warnings of cold waves, frosts, and severe local storms by telegraph at Government expense; and the gratuitous dissemination of such information by telephone, railway, telegraph, and train service, regular mail service, and Rural Free Delivery.

#### THE DIVISION OF METEOROLOGICAL RECORDS.

WILLIAM B. STOCKMAN, *Chief*.

This Division is charged with the compilation of meteorological and climatic statistics and their application to the varied needs of individuals, corporations, cities, and courts of law. The data compiled in this division are also supplied to the health seeker and the settler, to whom climate is a matter of primary importance in the selection of a place of residence.

#### THE INSTRUMENT DIVISION.

CHARLES F. MARVIN, *in Charge*.

The Instrument Division, as its name indicates, is charged with the installation and maintenance of the instrumental equipment of Weather Bureau stations. The various instruments in use by the Weather Bureau are first examined and tested in this Division.

#### THE SECTION OF BAROMETRY AND AERIAL EXPLORATIONS.

FRANK H. BIGELOW, *in Charge*.

In this section a study is being made of the problems of reducing barometric pressure, temperature, and vapor-tension observations in their relation to the circulation of the atmosphere. This section is also in charge of explorations of the upper air by means of theodolite and nephoscope observations and kite and balloon ascensions.

#### THE MONTHLY WEATHER REVIEW.

CLEVELAND ABBE, *Editor*.

The Monthly Weather Review contains text, charts, and statistical tables, illustrating the dominant weather conditions of each month; it also contains a brief statement of the weather conditions in each State and Territory as bearing upon the staple crops, and special contributions devoted to the progress of meteorology.

#### THE TELEGRAPH DIVISION.

JESSE H. ROBINSON, *Chief*.

The Telegraph Division is charged with the arrangement and control of telegraph circuits, the maintenance and repair of seacoast telegraph and telephone lines and submarine cables connecting isolated and exposed points with the shore; also the auditing of all telegraph accounts.

#### THE LIBRARY.

HERBERT H. KIMBALL, *Librarian and Climatologist in Charge*.

The library of the Weather Bureau contains about 25,000 volumes and 5,000 pamphlets bearing directly on the work of the Bureau; also an excellent card catalogue and bibliography. It is consulted daily by those interested in meteorology and its practical applications. The official in charge as climatologist attends to all correspondence pertaining to the relation of climate to health. He also has charge of the examinations for promotion in the Weather Bureau.

## THE PUBLICATIONS DIVISION.

JOHN P. CHURCH, *Chief*.

This Division is charged with the publication, issue, and distribution of weather maps, the Monthly Weather Review, and various charts and miscellaneous printed matter pertaining to the Weather Bureau.

Translation of foreign correspondence and of publications and manuscripts for consultation by officials of the Weather Bureau and for publication is done in this Division.

## THE DIVISION OF SUPPLIES.

FRANK M. CLEAVER, *Chief*.

This Division is charged with the purchase and issue of supplies and the supervision of contracts.

## BUREAU OF ANIMAL INDUSTRY.

*Chief*, D. E. SALMON; *Assistant Chief*, ALONZO D. MELVIN; *Chief Clerk*, E. B. JONES.

The work of the Bureau of Animal Industry in a general way is to investigate the existence of communicable diseases dangerous to live stock; superintend measures for their extirpation; cooperate with the States and Territories in similar work within their borders; and to make original investigations as to the nature and prevention of such diseases. It inspects live stock and their products for food consumption when entering into interstate and export commerce; has charge of the inspection of import and export animals, of the inspection of vessels for transportation of export animals, and of the quarantine stations for imported animals; generally supervises the interstate movement of cattle; collects and disseminates information pertaining to dairy interests and foreign markets of dairy products; and reports on the condition and means of improving the animal industries of the country.

## THE BIOCHEMIC DIVISION.

M. DORSET, *Chief*.

This Division prepares material for stamping inspected meats; also prepares the tuberculin used at the agricultural experiment stations in the quarantine service, and the mallein for diagnosing glanders in horses. Serum and other experiments in connection with hog cholera and swine plague are conducted by this Division. Serum is also prepared for use in connection with experiments with human tuberculosis. Other lines of work are: Metabolism experiments on chickens; analyses of different substances sent to the Division; milk investigations; the study of bacteriologic and biochemic factors in the production of flavor in butter and cheese, as well as the routine work of the office and laboratory.

## THE DAIRY DIVISION.

HENRY E. ALVORD, *Chief*.<sup>a</sup>

The Dairy Division maintains a general survey of the condition of the dairy industry of the country at large, in addition to special inquiries relative to the status of dairy organizations, dairy schools, and facilities for technical instruction, State dairy laws, the development of foreign markets for the dairy products of this country, the milk supply of cities and towns, and laws and ordinances in reference thereto. Reports upon all these lines of work are prepared and published. The chief, assistant chief, and special agents visit the dairy centers of the States and the insular possessions of the United States, and in this way gather and disseminate information useful to the industry at large.

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<sup>a</sup> Deceased October 1, 1904.

This Division is also charged with the details of administration of the laws concerning the inspection of factories and markets for "renovated butter," and of dairy exports in general; ten dairy inspectors are regularly on duty in this connection.

#### THE INSPECTION DIVISION.

A. M. FARRINGTON, *Chief*.

The Inspection Division has charge of the meat inspection, which is by law assigned to the Bureau of Animal Industry. This includes ante-mortem and post-mortem inspections of all animals for slaughter in stock yards and at abattoirs; the microscopic inspection of pork designed for export to countries requiring a certificate of inspection; the inspection of animals for export and the vessels carrying them; the inspection of Southern cattle in transit, and the disinfection of the cars carrying them; the inspection and, when necessary, dipping of sheep and cattle in interstate traffic to prevent the spread of scab.

#### THE PATHOLOGICAL DIVISION.

JOHN R. MOHLER, *Chief*.

The work of this Division is chiefly along the lines of pathological diseases of animals. It prepares and distributes blackleg vaccine and tabulates the results for publication; investigates outbreaks of diseases among animals; determines pathological specimens referred to the Division for diagnosis; prepares answers to numerous inquiries regarding diseases of animals. The Division also has charge of the work relative to rabies in the District of Columbia. Reports are prepared and published upon the experimental work carried on.

#### THE QUARANTINE DIVISION.

RICHARD W. HICKMAN, *Chief*.

This Division supervises the importation of animals and the work of the animal quarantine stations; attends in large measure to the correspondence relative to the diseases of animals; keeps the record of the expenditures of the Bureau, and annually prepares an itemized statement of these for Congress, in accordance with law.

#### THE ZOOLOGICAL DIVISION.

B. H. RANSOM, *Acting Zoologist*.

This Division collects and describes animal parasites of all kinds; determines such parasites as are sent to the Bureau and conducts correspondence regarding them; keeps a card index of animal parasites and a bibliography of literature relating to them; investigates diseases of parasitic origin, and prepares and publishes reports on such investigations.

#### THE EXPERIMENT STATION.

E. C. SCHROEDER, *Superintendent*.

The Experiment Station cooperates with the other divisions of the Bureau in experimental investigations; has immediate charge of the animals used for the production of hog cholera and swine-plague serum; conducts experiments with reference to Texas fever. The Station is located at Bethesda, Md., where a small farm is maintained in such a manner as to supplement all investigations conducted by the several divisions of the Bureau.

#### THE EDITORIAL OFFICE.

GEORGE FAYETTE THOMPSON, *Editor*.

The Annual Report of the Bureau is compiled in the Editorial Office; all manuscripts for bulletins and circulars are edited and such as require it are indexed; the proof reading for the Bureau is done here; special articles are prepared for the Report; correspondence is prepared with reference to goats and to statistics of animals and animal production.



## BUREAU OF PLANT INDUSTRY.

*Physiologist and Pathologist and Chief of Bureau*, BEVERLY T. GALLOWAY;  
*Editor*, J. E. ROCKWELL; *Chief Clerk*, JAMES E. JONES.

The Bureau of Plant Industry studies plant life in all its relations to agriculture. It includes: Vegetable Pathological and Physiological Investigations; Botanical Investigations and Experiments; Grass and Forage Plant Investigations; Pomological Investigations; Seed and Plant Introduction and Distribution; the Arlington Experimental Farm; Experimental Gardens and Grounds; Farm Management; and Tea Culture Experiments.

## VEGETABLE PATHOLOGICAL AND PHYSIOLOGICAL INVESTIGATIONS.

ALBERT F. WOODS, *Pathologist and Physiologist, in charge, and Acting Chief of Bureau in Absence of Chief.*

These investigations have for their objects the study of diseases of agricultural crops and economic plants; nutrition of plants; rotation of crops; the general application of the principles of pathology and physiology to agriculture; the problems of crop improvement; and the production of better varieties of agricultural plants and of crops resistant to disease by means of breeding and selection. The work is conducted by the following officers: Erwin F. Smith, Pathologist, in Charge of Laboratory of Plant Pathology; George T. Moore, Physiologist, in Charge of Laboratory of Plant Physiology; Herbert J. Webber, Physiologist, in Charge of Laboratory of Plant Breeding; Walter T. Swingle, Physiologist, in Charge of Laboratory of Plant Life History; Newton B. Pierce, Pathologist, in Charge of Pacific Coast Laboratory; Hermann von Schrenk, Special Agent, in Charge of Mississippi Valley Laboratory; Peter H. Rolfs, Pathologist, in Charge of Subtropical Laboratory; Merton B. Waite, Pathologist, in Charge of Investigation on Diseases of Orchard Fruits; Mark Alfred Carleton, Cerealist, in Charge of Cereal Laboratory; C. O. Townsend, Pathologist, in Charge of Sugar Beet Investigations; William A. Orton, Pathologist; W. M. Scott, Pathologist; Joseph S. Chamberlain, Physiological Chemist; Thomas H. Kearney, Physiologist; Cornelius F. Shear, Pathologist; Flora W. Patterson, Mycologist.

## BOTANICAL INVESTIGATIONS AND EXPERIMENTS.

FREDERICK V. COVILLE, *Botanist, in Charge.*

This Office investigates botanical problems, including the purity and value of seeds; methods of controlling the spread of weeds and preventing their introduction into this country; the commercial grading of grain and the discrimination of cultivated varieties; problems in tropical agriculture; the cultivation of drug and medicinal plants; the injurious effects of stock-poisoning plants, and antidotes for them; the native plant resources of the country; and other phases of economic botany. The Office includes: O. F. Cook, Botanist, in Charge of Tropical Agriculture; E. Brown, Botanist, in Charge of Seed-Testing Laboratory; Lyster H. Dewey, Botanist, in Charge of Fiber Plants; R. H. True, Physiologist, in Charge of Investigations of Medicinal and Poisonous Plants; Carl S. Scofield, Botanist, in Charge of Grain Grade Investigations.

## GRASS AND FORAGE PLANT INVESTIGATIONS.

W. J. SPILLMAN, *Agrostologist, in Charge.*

This office studies the natural history, distribution, and uses of grasses and forage plants, as well as their adaptation to various soils and climates; introduces promising foreign varieties; investigates the methods of cultivation and the uses of native and foreign sorts; studies the use of grasses as sand and soil binders; and investigates the problems connected with the utilization and management of range lands. In it are included: A. S. Hitchcock, Agrostologist, in charge of alfalfa and clover investigations; C. V. Piper, Systematic Agrostologist, in charge of herbarium and of investigations of the standard grasses; David Griffiths, Assistant Agrostologist, in charge of range investigations; C. R.

Ball, Assistant Agrostologist, in charge of investigations of horticultural varieties of forage plants; and D. A. Brodie, Executive Assistant to the Agrostologist in charge.

#### POMOLOGICAL INVESTIGATIONS.

GUSTAVUS B. BRACKETT, *Pomologist, in Charge.*

This branch of the Bureau collects and distributes information in regard to the fruit interests of the United States; investigates the habits and peculiar qualities of fruits; their adaptability to various soils and climates and conditions of culture. It studies the methods of harvesting, handling, and storing fruits with a view to improving our own markets and extending them into foreign countries. It includes: William A. Taylor, Pomologist, in Charge of Field Investigations; G. Harold Powell, Pomologist, in Charge of Fruit Storage Investigations; H. P. Gould, Assistant Pomologist, in Charge of Fruit District Investigations; George C. Husmann, Expert, in Charge of Viticultural Investigations.

#### SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

(Under the immediate direction of Chief of Bureau.)

This Office is charged with the purchase and distribution of valuable seeds and plants, including those allotted by law to Senators, Representatives, and Delegates in Congress, also those secured for experimental work conducted in cooperation with the Agricultural Experiment Stations and private experimenters in various parts of the country. The officers are: A. J. Pieters, Botanist, in charge; W. W. Tracy, sr., Superintendent of Testing Gardens; D. G. Fairchild, Agricultural Explorer; P. H. Dorsett, Pathologist, in Charge of Plant Introduction Garden; S. A. Knapp, in Charge of Demonstration Farms at San Antonio, Tex., and North Galveston, Tex., and De Quincey, La.; George W. Oliver, Expert Plant Propagator.

#### ARLINGTON EXPERIMENTAL FARM.

(Under the immediate direction of Chief of Bureau.)

The Arlington Farm is the field laboratory at Washington for the Bureau of Plant Industry. Each office of the Bureau carrying on field investigations from the city laboratories maintains experiment plats at the farm. At present the lines of work include truck-work investigations, nursery experiments, forage-plant experiments, pathological and physiological investigations, and cultural and variety tests with fruit. L. C. Corbett, Horticulturist, is in charge.

#### EXPERIMENTAL GARDENS AND GROUNDS.

(Under the immediate direction of Chief of Bureau.)

This branch is charged with the care and ornamentation of the parks surrounding the Department buildings; with the duties connected with the conservatories and gardens; and with the testing and propagating of economic plants. It carries on investigations for the purpose of determining the best methods of improving the culture of plants under glass, and other lines of investigations connected with intensive horticulture. Its work is in charge of E. M. Byrnes, Superintendent.

#### FARM MANAGEMENT.

(Under the immediate direction of Chief of Bureau.)

This branch is charged with the investigation of methods of farming pursued in the various sections of the country, and in the conduct of demonstration work in improved methods and systems of farm management. Its work is in charge of a committee from several offices of the Bureau, of which committee W. J. Spillman is chairman.

## TEA CULTURE EXPERIMENTS.

(Under the immediate direction of Chief of Bureau.)

This branch of the Bureau has for its object the study of tea with a view to producing it in this country. Experiments are conducted in tea culture, and methods of growing, curing, and handling the tea are being worked out. Rodney H. True, Physiologist, is in charge. The work is carried on at Summerville, S. C., under Dr. Charles U. Shepard, Special Agent; at Pierce, Tex., under John H. Kinsler, Special Agent, and in the laboratories at Washington, D. C.

## BUREAU OF FORESTRY.

*Forester and Chief, GIFFORD PINCHOT.*

The Bureau of Forestry collects and disseminates information of practical value bearing on the maintenance, improvement, extension, and utilization of American forests; advises on technical questions Federal officials charged with the care of forest land; examines into and reports on the desirability of creating new National forest reserves on public lands and of extending or modifying the present reserve boundaries; and gives expert assistance to timberland owners, public and private, to secure the introduction and practice of forest management. It prepares working plans for the conservative lumbering of National, State, and private forests, and supervises their execution. It studies commercially valuable trees to determine how, under forestry, their continued production may be secured and their yield increased; investigates the relations between the forest and fire, grazing, lumbering, stream flow, and irrigation; ascertains and recommends trees and methods suitable for protective and productive planting in different regions, and gives practical assistance to tree planters; tests the strength and durability of construction timbers, railroad ties, and other materials, and the relative value of different methods of preservative treatment of timber; conducts inquiries into forest products, improvements in the methods of securing them, and new sources of supply; and maintains a photographic laboratory and collection, and a forest library. Printed reports and correspondence disseminate the information gathered by the Bureau.

The field work of the Bureau has extended from Maine to Hawaii and from Porto Rico to Alaska. It includes the study of forest conditions and problems all over the country; the mapping of large areas of timber land, chiefly on the public domain, to show the character and utility of the growth; investigations of the grazing and fire problems in the reserves and elsewhere; the giving of advice to owners of forest lands and to farmers and others in need of planted forest growth for protection or wood supply; and the supervision of conservative lumbering operations which illustrate forest management on business principles. The land for the management of which the advice of the Bureau has been asked and furnished is in many tracts, large and small, and is owned by individuals, clubs, corporations, several of the States, and the United States Government.

The organization of the Bureau comprises six lines of work: Forest Measurements, Forest Management, Dendrology, Forest Extension, Forest Products, and Records.

## FOREST MEASUREMENTS.

*OVERTON W. PRICE, Associate Forester, in Charge.*

Forest Measurements is charged with the computation and final statement of all forest measurements obtained by the Bureau in its several lines of work, and with the making of all maps, drawings, and diagrams.

## FOREST MANAGEMENT.

*THOMAS H. SHERRARD, Assistant Forester, in Charge.*

When the owner (private or public) of woodland wishes to consider the possibilities of his property, if handled as a constant source of timber supply, the tract is examined by an expert to ascertain the condition of the standing



timber, the prospects of reproduction, the facilities for marketing, the best method of harvesting the present crop so as to secure the largest present and future yield, and the likelihood of success under management. A preliminary report is then made. If the owner decides on management, a working plan follows. This involves a careful study of the rate of growth of the different kinds of marketable timber, the computation of the proper interval between cuttings and of the amount of timber to be harvested, and, if desired, the recommendation of the necessary regulations to enable the work to go on under contract. The work on small woodlots is done without expense to the owner, but in the case of large tracts of land the traveling expenses and subsistence of the necessary assistants and helpers for the Bureau is borne by the proprietor. All this falls to Forest Management.

#### DENDROLOGY.

GEORGE B. SUDWORTH, *Assistant Forester, in Charge.*

This line of work comprises all matters pertaining to the life history of forest trees, including technical forest botanical studies. Special attention is given to the geographical and commercial distribution of tree species and to the investigation of forest resources, which includes investigations of forest areas to determine the composition of forests and the kinds, quality, and quantity of timber available. Another part of this work is the collection and installation of forest exhibits.

#### FOREST EXTENSION.

WILLIAM L. HALL, *Assistant Forester, in Charge.*

Forest extension has to do with the creation of new forest, whether by planting where at present there is none or by assisting an established forest to advance over areas where it is absent or insufficient. Its work consists in the preparation of planting plans for private landowners, planting on portions of the National forest reserves, and studies in forest replacement, or methods of aiding the forest to occupy new ground and to restore itself where it has been destroyed.

#### FOREST PRODUCTS.

HERMANN VON SCHRENK, *in Charge.*

This comprises the work of the Bureau in timber testing, to determine, under such conditions as actually obtain in structural work, the strength and properties of the principal merchantable timbers of the United States; and in experimental investigations of the durability of railroad ties, telegraph poles, and other forms of timber, of the effects of seasoning and treatment by preservative processes, and of the comparative value of low-grade or abundant timbers, when protected against decay by treatment and against wear by the adoption of mechanical devices, as substitutes for timbers now commonly used. It includes also studies of improved tie forms; of the relation between the mechanical properties of timbers and such factors as the rate of growth, time of cutting, manner of sawing, and the water content; and of economical methods of production of turpentine, charcoal, tannic acid, wood pulp, and other products of the forest.

#### RECORDS.

JAMES B. ADAMS, *in Charge.*

Under Records are included all office and routine matters, that portion of the correspondence relating to the distribution of publications and to matters not technical and not administrative, and the care of the files. The supervision of the purchase of supplies, the care of the quarters, and the custody of field instruments and equipment, of office supplies and furniture, and of the collection of forest photographs and the photographic laboratory, also fall under Records. It handles the accounts of the Bureau in preparing them for settlement by the Division of Accounts, and keeps a record of all expenditures made and liabilities incurred by the Bureau of Forestry.



## BUREAU OF CHEMISTRY.

*Chief, HARVEY W. WILEY.*

The Bureau of Chemistry traces its origin to the date of the establishment of the Department of Agriculture in 1862, during which year a chemist was appointed in conformity to the act of Congress to take charge of all chemical work relating to agriculture. The present Bureau, by direction of the Secretary of Agriculture, has charge of all the chemical work of the Department not otherwise provided for by law.

The Bureau of Chemistry confines its attention to questions of agricultural chemistry of public interest and other chemical investigations referred to it by the Government. Inquiries of value to individuals only, or to a small group of individuals, can not be taken up. In general the Bureau is unable to examine miscellaneous samples sent to it for that purpose. The only exception to this general rule is road materials, samples of which are examined for individuals, as stated under "Division of Tests."

## DIVISION OF FOODS.

*W. D. BIGELOW, Chief.*

The Division of Foods is charged with the study of the composition, nutritive value, and character of adulteration of human foods. In the past much work has been done, with various kinds of food purchased in the open market, in order to determine their purity and the character of adulteration commonly practiced. Careful attention has long been given to this subject under the provisions of the appropriation act authorizing the Bureau of Chemistry to investigate the adulteration, false labeling, and false branding of food products.

One of the most important activities of the Bureau of Chemistry consists in the inspection of imported food products under the law which went into effect on July 1, 1903. Under the provisions of this law the Secretary of Agriculture is authorized to inspect all imported food products, including under this head what is known generally as foods, beverages, condiments and ingredients used in the manufacture thereof. Every invoice of food products coming into this country is accompanied by a declaration made before a United States consul concerning the character of the shipment. The law requires that each package of food products shall be correctly labeled or branded in regard to the nature thereof and the place of production or manufacture. It also provides that no substance deleterious to health shall be added to any food product, and that food products which are forbidden or restricted in sale in the country where made or from which exported shall not be admitted into the United States. In the execution of this law collaboration has been established with the State and Treasury Departments. Through the State Department our consuls are instructed to secure from intending shippers a full description of the character of the goods which they propose to send, in the form of a duplicate of the invoice. To this duplicate is attached a declaration made by the shipper to the effect that the food products covered by the invoice in question do not in any way differ from the character of such products required by the inspection law. This invoice and declaration are sent by fast mail direct to the Department of Agriculture. The Treasury Department collaborates in the execution of this law by securing samples of such invoices as may be suspected of being adulterated or misbranded, or of containing a deleterious substance. Samples of these goods are secured by the agents of the Treasury at the ports of entry and forwarded to the Department of Agriculture for examination. Meanwhile the goods covered by the invoice are detained or removed under bond pending the result of the examination made by the Bureau of Chemistry. If the examination shows that the food products are of such a nature as to violate the provisions of the law, the importer is notified and given an opportunity to explain the matter. If the explanation is satisfactory the invoice is released and the goods admitted; if not, the importer must take the goods out of the United States. If this is not done within ninety days from the time of notification, the Secretary of the Treasury destroys them. In order to make the execution of the law more complete branch laboratories have been established in San Francisco and New York City.

This division also studies analytical methods for the examination of food,

partly in collaboration with the Association of Official Agricultural Chemists. At present the division is chiefly occupied with study of food preservatives, chemical problems in the ripening of fruits, and enforcement of the imported-food law.

#### DIVISION OF TESTS.

LOGAN WALLER PAGE, *Chief*; ALLERTON S. CUSHMAN, *Assistant Chief*.

The chief object of this division is to make standard tests on road material, free of charge, for the citizens of the United States. In addition to this, allied problems are studied, such as the suitability of clays for the manufacture of paving brick, drain tile, etc.; the testing of cements and concretes for road foundations, drains, gutters, and highway bridges. It is the intention of this division to aid, as far as possible, in the solution of all the problems of road materials, but more particularly those adapted to rural highways. It is not, however, the policy of the Department to undertake scientific investigations or tests of materials for manufacturers or others who desire to use the information thus acquired to promote commercial ends.

Any person desiring to have road materials tested will, on application, be supplied with instructions for collecting and shipping samples to the laboratory. Detailed information in regard to the methods of conducting tests is given in Bulletin No. 79 of the Bureau of Chemistry.

#### SUGAR LABORATORY.

(Under the personal supervision of Chief of Bureau.)

The Sugar Laboratory is charged with the chemical study of sugars and other carbohydrates. One of its principal duties is to examine the samples of sugar beets grown in collaboration with the agricultural experiment stations to determine the effect of environment upon the sugar content. This laboratory is also charged, in conjunction with the Contracts Laboratory, with the work done for the Treasury Department in controlling the polarizations of sugar for dutiable purposes at the chief ports of entry. A sample of sugar is sent each day to this laboratory from the ports of New Orleans, Philadelphia, New York, and Boston. The chemical work relating to the domestic sirup industry, that is, the manufacture of table sirup from the maple sap, sorghum, and sugar cane, is performed in the Sugar Laboratory, which also collaborates with the International Commission for Uniform Methods of Sugar Analysis in the standardization of international quartz plates for the control of polariscopes in different countries.

#### DAIRY LABORATORY.

G. E. PATRICK, *Chief*.

The Dairy Laboratory examines dairy products of every description and studies methods for such examination. A large part of the work is done in cooperation with the Bureau of Animal Industry, which is charged with the enforcement of the law regulating the sale and manufacture of renovated butter (May 9, 1902).

The Dairy Laboratory examines samples of dairy products, mostly cheese, taken by the custom officers in the enforcement of the imported-food law (March 3, 1903). Samples of dairy products received from other sources are examined whenever such work promises to be of public benefit. A thorough study has been made of the methods which have been proposed for distinguishing between renovated and genuine butter. The milk and butter consumed in the experiments now conducted by the Bureau of Chemistry upon the physiological effects of preservatives and coloring matters are also analyzed in this laboratory.

#### INSECTICIDE AND AGRICULTURAL WATER LABORATORY.

J. K. HAYWOOD, *Chief*.

This laboratory, in collaboration with the Bureau of Entomology, studies the composition of insecticides and fungicides sold on the American market with reference to their purity and practical value and with a view to increas-

ing their efficiency. The effect of various insecticides, especially arsenical insecticides, on the foliage of fruit trees has been studied.

In connection with the irrigation investigations made by the Office of Experiment Stations the laboratory examines the irrigation waters of the West and Southwest, especially those used in the rice fields of Texas and Louisiana. An examination of the leading mineral waters of the United States is being made which will be of value from a scientific standpoint, and will furnish data by which the statements made by bottlers of these waters and by dealers concerning their composition may be verified. As far as practicable the laboratory examines the water supplies of small communities which have no official chemist.

In addition to the above investigations for which the laboratory was organized, it is also engaged in a study of the composition of American cattle foods and of certain toxicological problems and questions relating to public health which do not come within the scope of the other laboratories.

#### DRUG LABORATORY.

LYMAN F. KEBLER, *Chief*.

The Drug Laboratory was organized March 1, 1903. It examines medicinal remedies to determine whether they conform to the standards of the Pharmacopœia. A careful study is being made of remedies not included in the Pharmacopœia for the purpose of developing methods of analysis and acquiring data which may lead to the establishment of uniform methods of analysis and standards of composition, of quality and strength. This question is studied with reference to the miscellaneous products now on the market, and with reference to the needs of the Department of Agriculture and other departments in their regular supplies. The laboratory examines regularly the chemicals used by the Bureau of Chemistry for the purpose of establishing standards and requiring contractors to conform to the specifications adopted. The laboratory also makes the analyses requested by the Post-Office Department in connection with fraudulent remedies offered through the mails.

Special attention is given to analytical methods for the examination of crude drugs and the products derived from them. The chief of the Drug Laboratory as referee on medicinal plants and drugs for the Association of Official Agricultural Chemists has undertaken a systematic collaborative work with other members of the association. For the present year this work includes methods for testing opium and is conducted in such a way as to represent the scientist, the manufacturer, and the chemist interested in the administration of drug laws. It is hoped that this collaborative work will lead to the development of simpler and better methods for testing drugs.

#### CONTRACTS LABORATORY.

L. S. MUNSON, *Chief*.

The Contracts Laboratory was organized July 1, 1903, for the purpose of examining materials to be purchased by the United States Department of Agriculture, to determine their purity and compliance with specifications, and to do the collaborative work, provided for by law, with other departments which may request such assistance from the Secretary of Agriculture. The work of this laboratory is extremely varied, and consists largely of the examination of materials submitted with bids for contracts or furnished on contract for the various Executive Departments. It includes also the examination of a large number and variety of materials regarding which there has arisen some question of classification for dutiable purposes. This laboratory also assists in the comparative sugar tests made with the ports of Boston, New York, Philadelphia, and New Orleans, as a part of the cooperative work with the Treasury Department.

Among the more important lines of contract work may be mentioned the investigation and examination of inks and other materials used by the Post-Office Department for postmarks and for canceling stamps; the examination of supplies for the Commissary Office, War Department; and the examination of chemical glassware used in the Bureau of Chemistry.



## PLANT ANALYSIS LABORATORY.

C. C. MOORE, *Chief*.

On July 1, 1904, this laboratory was established and charged with the investigation of the composition of fertilizers in which work the laboratory will cooperate with the referees of the Association of Official Agricultural Chemists, studying methods of analysis of fertilizers and fertilizing substances. Miscellaneous examinations of fertilizers are not made.

The laboratory is also to investigate the constitution of plants and is authorized to collaborate with the Bureau of Plant Industry in the chemical investigation of problems, in which the Bureau of Chemistry and the Bureau of Plant Industry are mutually interested.

## MICROCHEMICAL LABORATORY.

B. J. HOWARD, *Chief*.

This laboratory was organized in 1901 for the purpose of centralizing the microscopical work of the Bureau (with the exception of the petrographical investigations) in one special microscopical laboratory.

It is charged with the microscopical and microchemical study of foods, drugs, cattle feed, paper and textile materials, miscellaneous agricultural products, etc. Special attention is given to the histological study of fruits, spices, cereals, starches, and other agricultural products, both on account of its scientific interest and for the purpose of perfecting methods for detecting the adulteration of these products. The laboratory makes microscopical examinations of the urine and blood in connection with the work of the Bureau on the influence of preservatives on nutrition.

## LEATHER AND PAPER LABORATORY.

F. P. VEITCH, *Chief*.

This laboratory was established on July 1, 1904, for the conduct of the following investigations:

Investigations of tannins and tanning materials and their effects upon the strength and properties of leather, with a view to promoting the agricultural industries relating to the production of tannins and tanning materials and leather of a high quality;

All technical problems of a chemical nature relating to the production of tannins and tanning products;

All technical problems of a chemical nature relating to the production of leather;

All chemical and physical investigations of papers in regard to their fitness for use in the Department of Agriculture, and other Departments of the Government which may request such investigations;

All technical problems of a chemical nature relating to the production of paper, with a view to promoting the agricultural industries connected with the production of the raw materials and to the improvement of the quality of papers made.

## MISCELLANEOUS INVESTIGATIONS.

From time to time various lines of investigation which do not come within the defined scope of any division or laboratory are taken up by the Bureau. Such investigations may be illustrated by the following cases:

In collaboration with the Weather Bureau of the Department of Agriculture and with a number of the State agricultural experiment stations this Bureau is specifically directed by Congress to study the influence of environment upon the chemical composition of wheat, barley, and of the sugar and starch producing plants. The need of further study of this subject is generally recognized and this Bureau has the active collaboration of a considerable number of the State experiment stations in its prosecution. These investigations are under the personal supervision of the Chief of Bureau.

(Enological investigations are carried on under the direction of Mr. William B. Alwood, special agent of the Bureau of Chemistry. The investigation divides naturally into two parts, one dealing with the study of alcoholic ferments and the mal-organisms associated with them in fruit musts, ciders, wines, and fruit



by-products; the other with the composition of fruits and fruit juices and their fermented products and the critical examination of the residue which is left in the marc or pomace as a comparatively waste product.

## BUREAU OF SOILS.

*Soil Physicist and Chief of Bureau.* MILTON WHITNEY; *Chief Clerk,* A. G. RICE.

The Bureau of Soils is charged with the study of soils in their relation to practical agriculture; with the investigation of the physical and chemical properties of soils; with the investigation of the materials and methods involved in artificial fertilization and its influence upon the original soils; with the classification and mapping of soils in agricultural districts to show the distribution of the various soil types with a view to determining their adaptability to certain crops and their management and treatment; with the investigation of alkali problems, their relations to irrigation and seepage waters, the causes of the rise and accumulation of alkali, and the reclamation of abandoned lands; with the investigation of tobacco soils and of the methods of cultivating and of curing the crop, with especial reference to fermentation; the introduction of improved varieties into the principal tobacco districts of the United States; and the securing, as far as may be possible, a change in the methods of supplying tobacco to foreign countries.

### LABORATORY OF SOIL PHYSICS.

LYMAN J. BRIGGS, *Assistant Soil Physicist.*

The duties of the Laboratory of Soil Physics include the investigation of the physical properties of soils and their economic bearing; the physical examination and mechanical analyses of soil types established by soil survey parties; the preparation and testing of apparatus used in field work; and the investigation from a physical standpoint of such special soil problems as may arise.

### LABORATORY OF SOIL CHEMISTRY.

FRANK K. CAMERON, *Soil Chemist, in Charge.*

The Laboratory of Soil Chemistry has under its charge the investigation of the chemical properties of soils in their relation to plant growth; the chemical examination and analyses of soil types and the study of their requirements with regard to fertilization; the investigation of alkali problems, and the general direction of chemical methods in use by field parties.

### SOIL SURVEY.

(Under the immediate direction of Chief of Bureau.)

The Soil Survey is charged with the classification of soil types and the actual surveying and mapping of selected areas in various parts of the United States, the results of which are published each year in separate form and at the end of the year are published collectively in *Field Operations of the Bureau of Soils*. This report includes chapters on the location and boundaries of areas, history of settlement and agricultural development, climatic conditions, physiography and geology, characteristic soil types, special soil problems, methods of cultivation and irrigation, drainage and seepage waters, alkali, reclamation of abandoned lands, and general agricultural conditions. Accompanying these reports are also lithographic maps indicating in colors the location and distribution of principal soil types. Chemical and physical analyses of these soil types compiled by the laboratories are also given, and recommendations are made looking to improved methods of fertilization and cultivation and the possibilities of the introduction of new crops.

Assistants in charge of field parties: Frank Bennett, jr., F. E. Bonsteel, Jay A. Bonsteel, J. L. Burgess, R. T. Avon Burke, Thos. A. Caine, M. E. Carr, W. T. Carter, jr., George N. Coffey, J. A. Drake, C. W. Ely, E. O. Fippin, W. E. Hearn, J. Garnett Holmes, Chas. A. Jensen, G. B. Jones, J. E. Lapham, Macy H. Lapham, A. W. Mangum, H. W. Marean, W. E. McLendon, C. N. Mooney, Thos. D. Rice, W. G. Smith, H. J. Wilder.

## TOBACCO INVESTIGATIONS.

GEORGE T. MCNESS, *Tobacco Expert, in Charge.*

The study of the adaptability of certain soils to the production of different varieties of tobacco, of the methods of cultivation, of curing, and the introduction of improved types into areas adapted to them constitute the principal lines of work of this branch of the Bureau. Practical experiments are being conducted with a view to the introduction of the finer grades of Sumatra and Havana cigar types, and further experiments will be carried on looking to the improvement and increased production of standard varieties in sections where they are already grown. The introduction and successful growth of the high-priced Sumatra wrapper in Connecticut, which promises to practically do away with the importation of about \$6,000,000 worth of tobacco per annum, and the improved method of fermentation in Pennsylvania, resulting in a saving of considerably over half a million dollars annually to the tobacco trade of that State, may be cited as illustrations of the lines of work intrusted to this branch of the service. The study of the requirements of foreign markets and of the methods of cultivation, curing, and marketing in competing countries, and the dissemination of information thus obtained, fall within the province of this division. Assistants in this work are: George B. Massey, W. M. Hinson, John B. Stewart, L. W. Ayer, E. H. Mathewson, Harry Rich, and Henry Weinberg.

## ALKALI RECLAMATION INVESTIGATIONS.

CLARENCE W. DORSEY, *Scientist, in Charge.*

The reclamation of soils in arid regions where lands have been injured by seepage waters and the accumulation of alkali has been under investigation by the Bureau for several years. Actual field demonstrations of methods which have been successfully used in Egypt have been carefully investigated and adapted to conditions in this country, supplementing those devised through the investigations of this Bureau, and which are now being carried on in California, Utah, and Washington. While the ultimate success of this work has not been actually demonstrated as yet except in California, there is practically no doubt that the methods will prove thoroughly efficient, and will be the means of reclaiming and rendering productive millions of acres of land which are now lying idle.

This work is in charge of Mr. Clarence W. Dorsey, with Messrs. W. H. Heileman, William H. Knox, and Luther C. Holmes as assistants.

## SOIL MANAGEMENT.

FRANK D. GARDNER, *Soil Expert, in Charge.*

The Division of Soil Management has recently been organized for the comprehensive study of soils in their most direct relations to practical agriculture. Supplementing particularly the work of the Soil Survey, this Division is concerned with the study of special problems encountered by Soil-Survey parties and with the establishment and practical demonstration of improved methods of cultivation and handling of farm lands.

The adaptation of crops to soils, the study of the distribution and source of plant foods, fertilizer requirements of different soil types, and the practical demonstration of important results of the work of the Bureau of Soils come within the province of this Division.

## BUREAU OF ENTOMOLOGY.

*Entomologist and Chief*, L. O. HOWARD; *in Charge of Experimental Field Work*, C. L. MARLATT; *in Charge of Breeding Experiments*, F. H. CHITTENDEN; *in Charge of Forest Insect Investigations*, A. D. HOPKINS; *in Charge of Cotton Boll Weevil Investigations*, W. D. HUNTER; *in Charge of Agricultural Investigations*, FRANK BENTON; *in Charge of Field-crop Insect Investigations*, F. M. WEBSTER; *in Charge of Bollworm Investigations*, A. L. QUAINANCE.

The Bureau of Entomology obtains and disseminates information regarding injurious insects affecting field crops, fruits, small fruits and truck crops, forests and forest products, and stored products; studies insects in relation to

diseases of man and other animals and as animal parasites; experiments with the introduction of beneficial insects, and with the fungous and other diseases of insects, and conducts experiments and tests with insecticides and insecticide machinery. It is further charged with the investigations in apiculture and sericulture. The information gained is disseminated in the form of bulletins and circulars. Much museum work is done in connection with the department of insects of the National Museum, and insects are identified for experiment stations and other public institutions and private individuals.

The work of this Bureau is organized under the following sections:

#### FIELD-CROP INSECT INVESTIGATIONS.

This line of work comprises investigations on the insect enemies of the great staple farm products of the country, and is divided into two subsections: (a) Northern subsection, which embraces the study of the insect enemies of cereals and forage plants. Illustrative of this work are the investigations conducted by this office on the chinch bug, Hessian fly, and other grain pests, and on the various injurious species of grasshoppers and locusts; (b) Southern subsection, which includes the insect enemies of Southern staples, principally cotton, tobacco, and sugar cane. The work now being prosecuted on the Mexican cotton boll weevil and the bollworm and other cotton pests falls under this division.

#### FRUIT INSECT INVESTIGATIONS.

This field of inquiry includes the study of insect enemies of orchard fruits, and is also divided into subsections: (a) Investigations of the insect enemies of deciduous fruits, such as the pear, peach, plum, and apple, and is illustrated by work recently completed on the codling moth; (b) work on the insect enemies of orange and other citrus fruits, olive, fig, and other subtropical fruits.

#### TRUCK CROP AND SMALL FRUIT INSECT INVESTIGATIONS.

This field of investigation relates particularly to the insects affecting garden vegetables and small fruits, and is facilitated by the maintenance of a small plot in the Department grounds for the experimental study of the insects affecting such crops. The enormous increase in truck farming and in the growth of small fruits in this country leads to constant demands for special information covering this field.

#### FOREST AND FOREST PRODUCT INSECT INVESTIGATIONS.

This field of work has been established as a separate section, working in cooperation with the Bureau of Forestry, and has for its object the study of the insects injuriously affecting forest trees and their products, including felled timber, tan bark, building material, and all articles of wood employed in the useful arts. All serious insect outbreaks in the national forest reservations or in other natural forests are investigated and recommendations given which will decrease or terminate the losses resulting therefrom. Practical tests in the forest are in operation to demonstrate the possibility of controlling the principal insect enemies of the more important native trees.

#### INSECTICIDE AND INSECTICIDE MACHINERY INVESTIGATIONS.

This section covers the entire field of practical experimentation with insecticides and insecticide machinery. A chemist working in cooperation with this Bureau is detailed by the Bureau of Chemistry to take charge of the analyses and tests of new insecticides, and field operations and experiments are conducted on growing trees and vegetables. The enormous increase in the employment of mineral oils as a means of destroying insects has led to a special investigation of this subject now in progress.

#### INVESTIGATIONS OF INSECTS AFFECTING STORED PRODUCTS.

Under this head fall all the investigations of the insect enemies of such materials as stored grain, flour, meal, and prepared cereals and leguminous seeds.



dried fruits, nuts, drugs, tobacco, herbarium specimens, as well as all dried meats and other animal products, such as cheese, leather, hides, wool, various fabrics, etc. The investigations are directed toward a study of life histories and the determination of means of preventing the ravages of the insects concerned.

#### INVESTIGATIONS OF INSECTS AFFECTING SHADE TREES AND ORNAMENTAL PLANTS.

This constitutes a section separate from the investigations on the insect enemies of forests, and although some of the insects are identical the problem of how to deal with them is in most cases quite distinct. It includes the economic treatment of borers, tree defoliators, bark lice, and plant lice, as well as other insects that affect trees in public parks and in the streets of large cities. A number of insects of this class, importations from Europe, such as the leopard moth, gypsy moth, brown-tail moth, and imported willow curculio, are demanding more attention year by year. This section includes also investigations of insects affecting greenhouse and garden ornamental plants and trees.

#### INVESTIGATIONS OF INSECTS IN RELATION TO DISEASES OF MAN AND OTHER ANIMALS AND AS ANIMAL PARASITES.

This field of investigation has assumed very great importance during the last few years as a result of the connection established between the mosquito and various diseases, such as malaria and yellow fever, and the agency of the house fly in the dissemination of typhoid fever. It covers not only the rôle played by insects as conveyors and disseminators of diseases among man and the lower animals, but also deals with insects as internal and external animal parasites, including such species as the biting flies, the hornfly, gadfly, buffalo gnats, etc.

#### APICULTURAL INVESTIGATIONS.

The importance of the apiarian interests of America are recognized by the establishment of an office for special investigation in this field. Inquiry is under way to determine what crops may be profitably employed to fill the gaps in the honey yield or to create artificial pasturage for apiaries, and efforts are being made also to introduce new honey-producing plants from abroad. The different races of bees are being tested to determine their relative availability for this country, and experiments are being conducted in the crossing of different varieties looking to the production of a superior honey-producing strain.

#### SERICULTURAL INVESTIGATIONS.

The work authorized by Congress for the conduct of special investigation of the subject of silk raising in America is conducted by this section. Large quantities of mulberry plants have been imported from France and are being disseminated throughout the country. There has also been a considerable importation of silkworm eggs, or "seed," which have also been widely distributed. Two modern power reels have been brought from France and are set up, one in Washington and one in the South, so that the small lots of cocoons produced by individual experimenters in this industry may be reeled and find a market. For the present this office has adopted the policy of purchasing the cocoons raised at a fair rate. The intention is to make a determined effort to establish silk raising on a practical basis in this country.

#### INTRODUCTION OF FOREIGN BENEFICIAL INSECTS.

Results of extraordinary value in the control of certain imported insect pests have been secured by the introduction of their natural enemies, and two or three notable successes have resulted in the annual saving of more than the cost of the Bureau of Entomology since its origin as a Division. The introduction of enemies of the boll weevil comes in this field. When such work is carried out by expert entomologists there need be no risk of introducing injurious forms, but if attempted by private individuals there is danger of the introduction of harmful species.



## GENERAL INVESTIGATIONS.

Much work accomplished by this office does not fall under any of the headings noted above. Such are supervision of quarantine operations, propagation and distribution of fungus diseases of insects, and the identification of material for experiment stations and individuals, not only in the United States, but in various foreign countries. A great deal of technical work is also done by the employees of this office, most of whom are specialists in some particular group of insects and do more or less work in the classification and care of the museum material coming directly under their hands. No little part of the work is also represented by the correspondence, which is very voluminous. The preparation of bulletins and circulars and general reports covering the general investigations already referred to is a very important feature of the work.

## DIVISION OF BIOLOGICAL SURVEY.

*Chief, C. HART MERRIAM; Assistant Chief, A. K. FISHER.*

The Division of Biological Survey studies the geographic distribution of animals and plants, and maps the natural life zones of the country; it also investigates the economic relations of birds and mammals, recommends measures for the preservation of beneficial and the destruction of injurious species, and has been charged with carrying into effect the provisions of the Federal laws for the importation of wild birds and other wild animals, and for the protection of game by control of interstate trade in game and other means.

The Division is divided into three sections, the work being distributed as follows: (1) Biological surveys and investigations of the geographic distribution of mammals and birds, under the immediate direction of the Chief of the Division; (2) investigations to determine the relation of birds to agriculture, their food habits, etc., in charge of F. E. L. Beal; (3) supervision of matters relating to protection of game and the importation of foreign birds and animals, in charge of Dr. T. S. Palmer.

## DIVISION OF ACCOUNTS AND DISBURSEMENTS.

*Chief, F. L. EVANS; Assistant Chief, A. ZAPPONE; Cashier, M. E. FAGAN.*

The Division of Accounts and Disbursements audits, adjusts, and pays all accounts and claims against the Department; decides questions involving the expenditure of public funds; prepares advertisements, schedules, contracts for annual supplies, leases, agreements, bonds, and letters of authority; writes, for the signature of the Secretary, all letters to the Treasury Department pertaining to fiscal matters and all letters to the Department of Justice; attends to litigation in which the Department is interested; issues requisitions for the purchase of supplies and requests for passenger and for freight transportation; prepares the annual estimates of appropriations, and transacts all other business relating to the financial interests of the Department.

## DIVISION OF PUBLICATIONS.

*Editor and Chief, GEO. WM. HILL; Associate Editor, JOS. A. ARNOLD; Chief Clerk, A. I. MUDD.*

The Division of Publications is the publishing house of the Department of Agriculture. Its force comprises editors, proof readers, compilers, indexers, abstracters, artists, draftsmen, engravers, and photographers, together with clerks and laborers engaged in the distribution of the publications. The Division is charged with (1) preparation and editing of the manuscripts for the publications of the Department, including the Yearbook, annual reports, bulletins, etc.; (2) the preparation, printing, and distribution of Farmers' Bulletins; (3) supervision and equitable assignment of printing fund (\$160,000); (4) the general direction of expenditures under the appropriation for Farmers' Bulletins, artists and illustrations, artists' material, and material and labor in the distribution of documents, aggregating \$400,640; (5) the supervision of the printing and binding done for the Department in both the main and the

branch office of the Government Printing Office; (6) the preparation of drawings for illustrations and wood engravings; (7) the distribution of Department publications; (8) the preparation and distribution of official information and of advance notices of publications to agricultural writers and papers. The Division of Publications is the authorized medium of all official communications between the Department of Agriculture and the Government Printing Office.

#### EDITORIAL WORK.

The editorial work involves the editing and preparation for printing of all the publications of the Department, with the exception of those issued from the Weather Bureau, and including the Yearbook and Farmers' Bulletins. The total number of printed pages of new matter so edited and prepared in the fiscal year 1904 was 22,888, besides 15,018 of matter revised or reprinted. It involves also the general oversight and proof reading of all the job work and other printing done in the Branch Printing Office. The number of requisitions for printing issued to the Public Printer from the editorial office during the fiscal year 1904 was: Main Office, 1,278; Branch Office, 3,446.

The editorial corps includes, besides the Editor and the Associate Editor, Assistant Editors as follows: B. D. Stallings, Charles H. Greathouse, S. Edwin Thornton, Ephraim Cornman, and W. F. Harding.

#### YEARBOOK.

The preparation of the Yearbook of the Department, which occupies a considerable portion of the time of this Division, involves the selection of timely articles and the presentation of the year's progress in agriculture. The editing of this material and putting it in form for the printer, the selection and making of illustrations, reading proof, indexing, and final supervision of publication is in progress during the greater part of each year.

The Yearbook is edited, under the personal direction of the Secretary, by the Editor in Chief, with the assistance mainly of B. D. Stallings and Charles H. Greathouse.

#### FARMERS' BULLETINS.

The Division of Publications is charged by law with the preparation and issue of short treatises in plain language which will be directly useful to farmers in the practical work of agriculture. These publications are intended to give clear directions for work, and have no place for theory nor discussion. They are expected to embody the settled results of investigations by the scientific Divisions of the Department and of the Experiment Stations, but also present other important agricultural methods or facts not otherwise brought to the attention of farmers generally. Under the law four-fifths of all the Farmers' Bulletins printed are distributed upon the orders of Senators, Representatives, and Delegates in Congress. The total number of these bulletins printed during the last fiscal year was 6,602,000 copies.

This branch of the work is under the immediate charge of the Associate Editor, Jos. A. Arnold.

#### DOCUMENT SECTION.

Under section 92 of the act providing for the public printing and binding and the distribution of public documents, approved January 12, 1895, the duty of distributing the publications of the Department of Agriculture is assigned by the Secretary to the Editor and Chief, who is required to keep a detailed account of all publications received and distributed and to take measures to avoid duplication. The work is under the immediate direction of R. B. Handy, Assistant in Charge of the Document Section.

This Section receives from the Public Printer, cares for, and distributes all the publications of the Department of Agriculture. A large force of clerks and laborers is employed in directing franks under which the documents are mailed, in keeping account both of their distribution to Congressmen and to miscellaneous applicants, and in storing, folding, wrapping, and other work incidental to mailing the publications.

The extensive correspondence in replying to applicants for publications, the keeping of card indexes, the preparation of registry lists, and the care of the mailing lists of the Department necessitate the employment of a large corps of clerks, besides a very large force of folders and laborers.

## ILLUSTRATIONS.

In this branch of the work a corps of artists, draftsmen, wood engravers, photographers, and clerks is engaged in the preparation of the illustrations for the publications of the Department. In the type room are preserved the original cuts of these illustrations (except lithographs), from which electrotypes are furnished to applicants at a nominal cost. This Office purchases all instruments and artists' material required in the work of illustrations, and supplies the same to other Bureaus, Divisions, and Offices of the Department, in which artists and draftsmen are employed.

This part of the work is under the immediate supervision of the Associate Editor, Jos. A. Arnold.

## DEPARTMENT PRINTING OFFICE.

The Department Printing Office is a branch of the Government Printing Office; Frank Wallace, foreman, in charge. It is utilized for the printing of letter heads, envelopes, note heads, circulars, labels, blanks, postal cards, small bulletins, etc. Since the Office was by law made a part of the Government Printing Office its facilities have been greatly increased and the quality of the work very much improved, so that work that was of necessity formerly sent to the Main Office is now done to our entire satisfaction in the Branch Office. During the last year the various kinds of job work done aggregated 17,285,233 pieces.

Under the law the Editor and Chief of the Division of Publications is designated by the Secretary of Agriculture to be responsible for the work done in the Branch Office, and he is required to make out all requisitions for work therein and submit a quarterly report thereon.

## BUREAU OF STATISTICS.

*Statistician and Chief of Bureau*, JOHN HYDE; *Associate Statistician*, EDWIN S. HOLMES, JR.; *Assistant Statistician*, STEPHEN D. FESSENDEN; *Chief Clerk*, CHARLES C. CLARK; *Chief of Division of Domestic Crop Reports*, VICTOR H. OLMSTED; *Chief of Division of Foreign Markets*, GEORGE K. HOLMES; *Assistant Chief of Division of Foreign Markets*, FRANK R. RUTTER.

The Statistician, through the agency of about 250,000 correspondents, collects statistics and makes estimates concerning the products of agriculture. He estimates the area annually sown to corn, wheat, oats, barley, rye, buckwheat, flax, potatoes, hay, cotton, and tobacco, and collects information throughout the growing season concerning the condition of these crops, as to growth and vitality, on the first day of each month. At the close of the crop year he calculates the quantitative results of the harvest of each of these products and estimates their farm value on December 1. Complementary to the above system, he collects information at regular intervals concerning the growth and vitality of meadows, pastures, clover, timothy, sugar cane, sorghum, rice, hops, apples, peaches, pears, and grapes. Similar information as to the principal foreign crops is obtained through a special foreign agent of the Bureau, direct cablegrams from foreign governments, and through consular, agricultural, and commercial authorities.

Under the direction of the Statistician particular subjects affecting agricultural interests are investigated, and the results of such investigations are published, from time to time, in bulletin form.

Under the direction of the Statistician the conditions of agricultural supply and demand in foreign countries are studied with the object of extending the foreign trade of the United States.

The change from a division to a bureau and the somewhat larger appropriation have made possible an improved office organization and more extended field service. The organization by divisions, however, has not yet been completed. One hundred and fifty persons are employed under the direction of the Statistician.

The Statistician makes estimates of the stocks of corn, wheat, and oats held on farms in the United States at certain fixed and regular dates, and indicates the proportion of these crops that has then been shipped out of the county where grown.



He estimates the number and value, by species, of animals on farms in the United States at the beginning of each year, and indicates the annual losses from disease and exposure. He calculates the quantity of wool produced annually and estimates the average weight of fleeces by States and Territories.

He compiles and tabulates, from official and commercial sources, the world's production, by countries, of corn, wheat, oats, barley, rye, sugar, flax, and hops; and records and tabulates prices of the principal agricultural products in various markets of the United States.

He records, tabulates, and coordinates statistics of agricultural production, distribution, and consumption, the authorized data of governments, institutes, societies, boards of trade, chambers of commerce, produce exchanges, trade journals, and individual experts.

Concise statements of the more important results of his investigations concerning domestic agriculture are promptly and simultaneously disseminated by telegraph through all the States and Territories; and cards, upon which are printed such results as soon as ascertained each month, are immediately sent by mail to every postmaster in the United States to be conspicuously posted in his office for the information of the public. Detailed statements of the results of investigations concerning both domestic and foreign agriculture are issued through an official monthly publication entitled the *Crop Reporter*, designed for general circulation among producers and consumers.

#### DIVISION OF DOMESTIC CROP REPORTS.

The Division of Domestic Crop Reports handles the reports of the various classes of crop correspondents of the Bureau of Statistics throughout the United States. Blank schedules are sent each month to township, county, and State correspondents, to be used by them in making their reports regarding crop areas and conditions, quantities and qualities of production, live stock, etc., as indicated in the preceding description of the work of the Bureau of Statistics. These reports, when received, are tabulated for the use of the Statistician in compiling his monthly reports as published by the Department of Agriculture in the *Crop Reporter*. At intervals blank schedules are sent to cotton ginner, individual farmers, and special correspondents to be used by them in making reports regarding cotton, live stock, and the areas and quantities of various crops, which are tabulated for the Statistician's use in the same manner as the reports referred to. Special information regarding the commercial cotton crops of the United States is collected through cotton-carrying railroads and special agents located at shipping and export points, which is used in the preparation of an annual special report regarding the commercial cotton crop of the country.

An important branch of the work of this Division consists in keeping filled the ranks of the Bureau's crop correspondents, who number about a quarter of a million, among whom numerous changes—both in personnel and post-office addresses—occur from month to month.

The Chief of this Division has charge of the making of such statistical computations and compilations as are required for the use of the Bureau of Statistics and for other Bureaus of the Department of Agriculture which have need of such work.

The mailing lists of the Bureau are under the direction of the Chief of this Division, who also has charge of receiving, assorting, and distributing the voluminous daily mail of the Bureau.

#### DIVISION OF FOREIGN MARKETS.

The Division of Foreign Markets has for its object the extension of the agricultural export trade of the United States. The organization of the Division was prompted by the need of wider foreign markets, resulting from an extraordinarily rapid development of domestic agriculture.

The conditions of demand and supply in foreign countries are studied, and for this purpose the official statistics of production, importation, and exportation published by the various governments are chiefly used. These statistics are supplemented by further details obtained from reports of consular officers, from trade journals, and from various other sources of information. The official customs returns of the United States, so far as they relate to agricultural products, are also carefully examined, classified, and analyzed. Instances



of increase or decrease are particularly studied to ascertain the causes of such movements with a view to suggesting means for further stimulating the trade or for removing obstacles that retard its natural growth. In cases of special importance, where printed returns and correspondence prove inadequate, a representative of the Office is sent to obtain by personal investigation the information needed.

The many inquiries received regarding our foreign trade necessitate a large correspondence, which, however, has been greatly facilitated by the policy of incorporating in printed reports the information of most general interest.

Of the reports of the Office, three, represented for the current year by Circular No. 25 and Bulletins Nos. 31 and 32, are now issued as a regular annual series. The first gives the value and, wherever practicable, the quantity of the various agricultural products imported and exported during the last two years, but without detail as to countries of source or destination. That publication is supplemented by two fuller reports, one showing the various sources of each agricultural import and the other the distribution of each agricultural export for the last five years. Summary tables in these reports give the total agricultural imports and the total agricultural exports of the United States with the several foreign countries and with our insular dependencies. The three bulletins together constitute a complete statistical exhibit of the agricultural import and export trade of this country.

Work has recently been begun on a new series of reports covering in the fullest possible manner the agricultural import trade of each of the leading European countries. As a means of indicating the lines of trade that afford the most promising opportunities for development, detailed statistics are given as to the proportion of the various imports contributed by the United States and by its commercial rivals.

From time to time special studies are made of particular agricultural products for the sale of which there is keen and complicated international competition. Attention is devoted to the facilities for transporting agricultural products from this country, the various lines of steamships, ocean freight rates, and facilities for refrigerating. Among other subjects within the scope of the work of this Division are the prices of agricultural products, domestic and imported, in prominent foreign countries, and a study of successful export trade in certain agricultural products of other countries. This division possesses a very large subject index of references to articles in an immense number of current publications, domestic and foreign. These articles are of every imaginable sort and bear exclusively upon the exportation of agricultural products, actual and potential.

#### FIELD SERVICE.

The service outside of Washington consists of the Special Field Service, 39 State Statistical Agents, 7 Cotton Agents, and 250,000 voluntary correspondents.

#### SPECIAL FIELD SERVICE.

Special Field Agents: Thomas B. Baldwin, John S. Charlton, Heber M. Creel, John J. Darg, Nat. C. Murray, John E. Rickards; Chief Inspector of Cotton Agencies, B. C. White; Garden Truck Expert, T. C. Shaw; Rice Expert, De Lancey Evans.

These experts systematically traverse the agricultural sections of the United States, carefully note the development of each important crop, keep in close touch with the best-informed opinion throughout the country, and report to the Statistician.

Special European Agent: E. T. Peters.

This statistical expert resides in London, England, and is in charge of foreign crop reports. His duty is to keep in close touch with the statistical offices of the various European governments, and to secure and report information of value to agricultural interests of the country.

The State Statistical Agents maintain special corps of county correspondents, and report to the Statistician upon agricultural conditions for the states which they represent.

The Cotton Agents reside at the principal cotton markets of the South, report on the commercial movement of cotton, and furnish the Statistician with any special information that may be required with regard to cotton.

The voluntary correspondents make reports on acreage, production, and condition of various crops from time to time, on the request of the Statistician.

## LIBRARY.

*Librarian*, JOSEPHINE A. CLARK; *Assistant Librarian*, CLARIBEL R. BARNETT.

The Librarian purchases books and periodicals, supervises their arrangement and cataloguing, and has charge of the preparation of bibliographies and similar publications. The Librarian is also in charge of the mailing lists for the distribution of Department publications in foreign countries.

## OFFICE OF EXPERIMENT STATIONS.

*Director*, A. C. TRUE; *Assistant Director*, E. W. ALLEN; *Chief Clerk*, MRS. C. E. JOHNSTON.

The work of the Office of Experiment Stations includes: (1) Relations with American and foreign institutions for agricultural education and research, together with the supervision of expenditures of the agricultural experiment stations in the United States; (2) the preparation of publications mainly based on those of the experiment stations; (3) the management of the experiment stations in Alaska, Hawaii, and Porto Rico; (4) the promotion of farmers' institutes; (5) the supervision of special investigations ordered by Congress and assigned to the Office by the Secretary of Agriculture, which involve cooperation with the agricultural colleges and experiment stations. At present these include investigations on the nutritive value and economy of human foods and on irrigation and drainage.

### RELATIONS WITH INSTITUTIONS FOR AGRICULTURAL EDUCATION AND RESEARCH.

(Under the immediate supervision of the Director, assisted by D. J. Crosby.)

The Office represents the Department in its relations with the agricultural colleges and experiment stations established under the acts of Congress of July 2, 1862, March 2, 1887, and August 30, 1890, which are now in operation in all the States and Territories. It collates and publishes information regarding the organization, equipment, resources, and work of the agricultural colleges, schools, experiment stations, and similar institutions in this and other countries. It indicates lines of inquiry, aids in the conduct of cooperative experiments, reports upon the expenditures and work of the stations, and in general furnishes them with such advice and assistance as will best promote the purposes for which they were established.

### RELATIONS WITH FARMERS' INSTITUTES.

JOHN HAMILTON, *Farmers' Institute Specialist*.

The Office investigates and reports upon the organization and progress of farmers' institutes in the several States and Territories, and aids in making such organizations more effective for the dissemination of the results of the work of the Department of Agriculture and the agricultural experiment stations, and of improved methods of agricultural practice.

### EXPERIMENT STATION RECORD.

E. W. ALLEN, *Editor*.

The Experiment Station Record, begun in 1889, comprises abstracts of the bulletins and annual reports of the experiment stations in the United States, the publications of the United States Department of Agriculture, books, journals, and miscellaneous publications containing reports of investigations in agricultural science in the different countries of the world; special articles by American and foreign experts in agricultural science; editorials on important matters regarding the progress of agricultural education and science;

suggestions of lines of inquiry for our stations, and notes on the organization, equipment, and development of institutions for agricultural education and research at home and abroad. Each volume of the Record consists of twelve numbers, the last of which contains detailed author and subject indexes. This journal is sent without charge to institutions for agricultural education and research in this country and the officers of such institutions, to similar institutions in foreign countries, important libraries, and to a select list of scientists and specialists who cooperate with the Department by furnishing information, exchanging publications, or otherwise. It is also sold by the Superintendent of Documents at 10 cents a number, or \$1 a volume. The editorial staff engaged in the preparation of this journal is as follows: Chemistry, Dairy Farming, and Dairying, The Editor and H. W. Lawson; Meteorology, Fertilizers and Soils (including methods of analysis), and Agricultural Engineering, W. H. Beal; Botany and Diseases of Plants, Walter H. Evans; Foods and Animal Production, C. F. Langworthy; Field Crops, J. I. Schulte; Entomology and Veterinary Science, E. V. Wilcox; Horticulture, C. B. Smith.

#### EDITORIAL DIVISION.

W. H. BEAL, *Chief*.

The bulletins and miscellaneous publications of the Office may be classified as follows: (1) Technical bulletins; (2) Farmers' bulletins, including the sub-series entitled "Experiment Station Work;" (3) Card Index of Experiment Station Literature; (4) circulars; (5) miscellaneous publications, comprising schedules, articles published as separates, and charts.

In the preparation and editing of the bulletins and miscellaneous publications of the Office the Chief of the Editorial Division is assisted by the staff of the Experiment Station Record.

#### DIVISION OF INSULAR EXPERIMENT STATIONS.

WALTER H. EVANS, *Chief*.

This Division is charged with the general business connected with the management of experiment stations in Alaska, Hawaii, and Porto Rico.

#### ALASKA AGRICULTURAL EXPERIMENT STATIONS.

C. C. GEORGESON, *Sitka, Special Agent, in Charge*.

The agricultural investigations in Alaska are conducted under the direction of this Office. The main station is located at Sitka. Investigations are also carried on at Kenai, in Cook Inlet; at Copper Center, in the valley of the Copper River; and Rampart, in the Yukon Valley. The work consists of field experiments with vegetables, cereals, and forage plants; the maintenance of live stock; the curing of hay and silage; the distribution of seeds, and an agricultural survey of the Territory. Besides the special agent in charge, the officers of the station are as follows: R. W. De Armond, Assistant at Sitka; P. H. Ross, Assistant at Kenai; J. W. Neal, Assistant at Copper Center; F. E. Rader, Assistant at Rampart.

#### HAWAII AGRICULTURAL EXPERIMENT STATION.

JARED G. SMITH, *Honolulu, Special Agent, in Charge*.

The Hawaii Agricultural Experiment Station has been established under the direction of this Office, with headquarters at Honolulu, where a tract of land has been reserved for its use by the Hawaiian Government. The investigations include experiments with coffee, forage crops, fiber and horticultural plants, and investigations in vegetable pathology, and in entomology. Besides the special agent in charge, the officers of the station are as follows: D. L. Van Dine, Entomologist; E. C. Shorey, Chemist; and J. E. Higgins, Expert in Horticulture.



## PORTO RICO AGRICULTURAL EXPERIMENT STATION.

D. W. MAY, *Special Agent, in Charge.*

The Porto Rico Agricultural Experiment Station has its headquarters at Mayaguez, on a tract of land of 235 acres purchased for its use by the insular government. Investigations are in progress on questions relating especially to the growing of coffee, field crops and horticultural plants, the development of animal industry and dairying, soils, vegetable pathology, and entomology. The officers of the station are: The Special Agent in Charge; O. W. Barrett, Entomologist and Botanist; J. W. Van Leenhoff, Coffee Expert; H. C. Hendricksen, Assistant in Horticulture; E. F. Curt, Farm Superintendent; and Jessie F. Springer, Clerk and Stenographer.

## NUTRITION INVESTIGATIONS.

W. O. ATWATER, *Chief.*

The investigations on the food and nutrition of man in charge of this Office include: (1) Dietary studies; (2) digestion experiments; (3) cooking experiments; (4) metabolism experiments.

Investigations are carried on largely in cooperation with the agricultural colleges and experiment stations in different parts of the country. The office of the chief of the investigations is at Middletown, Conn., where the following officers are also located: F. G. Benedict, Physiological Chemist; R. D. Milner, Editorial Assistant.

Metabolism experiments with the respiration calorimeter, and digestion experiments and studies of general experimental methods are carried on at Wesleyan University, Middletown, Conn.; dietary studies and digestion experiments are conducted at the University of Maine, Orono, Me., by C. D. Woods, at the University of Tennessee, Knoxville, Tenn., by C. E. Wait, and at the University of Georgia, Athens, Ga., by H. C. White; metabolism experiments by H. C. Sherman, of Columbia University, New York, N. Y.; investigations on meats at the University of Illinois, Urbana, Ill., by H. S. Grindley; on cereals at the University of Minnesota, Minneapolis, Minn., by Harry Snyder; and on fruits at the University of California, Berkeley, Cal., by M. E. Jaffa.

Editorial work, correspondence, etc., relating to the nutrition investigations is carried on at the Washington office by C. F. Langworthy.

## IRRIGATION AND DRAINAGE INVESTIGATIONS.

ELWOOD MEAD, *Chief.*

The irrigation investigations of this Office deal with (1) the legal and economic questions created by the appropriation and use of water in irrigation in the United States; (2) the duty of water and the promotion of more economical methods of distribution than those in common use; (3) the use of different kinds of power for irrigation and other agricultural purposes; and (4) the engineering features of drainage.

These investigations are carried on in different parts of the country, largely in cooperation with agricultural colleges and experiment stations and the State irrigation offices. A station for the supervision of field investigations in the Rocky Mountain States is maintained at Cheyenne, Wyo., where C. E. Tait is in charge. The headquarters for the field work of the Pacific Coast States are at Berkeley, Cal., where Samuel Fortier is in charge. R. P. Teele is Editorial Assistant and C. G. Elliott is Engineer in Charge of Drainage Investigations.

## OFFICE OF PUBLIC ROAD INQUIRIES.

Director, MARTIN DODGE; Assistant Director, MAURICE O. ELDRIDGE.

The Office of Public Road Inquiries investigates systems of road management throughout the United States; studies the best methods of road making and road maintenance; and conducts investigations and experiments regarding the best methods of road building.

The investigations of the Office are mainly directed: (1) to ascertaining, as nearly as practicable, the loss by bad roads and the benefit of good roads; (2) to demonstrating the interest of cities and towns, and the owners of property of all kinds in the improvement of country roads; (3) to developing the methods by which all of these interests may cooperate with the farmers in the work of road improvement; (4) to discovering what actual and systematic road improvement is being carried on in any part of the United States, and how the same or modified methods may be applied to other sections; (5) to discovering road materials in the various sections of the country; (6) to discussing new plans for road construction and encouraging experiments in this direction.

In addition to publishing reports on these subjects, the Office cooperates with the agricultural colleges and experiment stations as well as with local authorities in the building of short sections of roads as object lessons, furnishing the expert supervision and securing the loan of the machinery, while the college or local contributors furnish the road materials, labor, fuel, etc., including grading, wherever required. In each locality where such roads are built the natural conditions and materials are carefully inspected and studied and the road is constructed with great care, not merely to serve as a sample of the best that is practicable, but to be so adapted to the locality as to illustrate the best uses of local materials. During the construction of such roads meetings or conventions are usually held, where illustrated lectures and addresses are delivered on the various phases of the road subject.

